CAPILLARY FLOW POROMETRY IN NON-WOVEN FIBROUS FILTER MEDIA: IMPACT OF WETTING LIQUID AND MODUS OPERANDI

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Capillary flow porometry is a well-established technique for measuring pore size distributions in polymer membranes and fibrous media within a useful range of typically about 1 to 50 µm. Its operating principle is based on saturating small samples of the media completely with a wetting liquid, and then progressively "blowing out" pores with air by increasing the differential pressure Δp across the sample. From the attendant increase in volumetric flow rate (or flow velocity) through the sample one can then derive a cumulative pore size distribution. Being a flow-based method, capillary flow porometry is quite attractive also to characterize porous media used for filtration: It is often preferable to purely geometric or tomographic techniques and also less cumbersome. Porometers are available commercially, and ASTM F316 describes their use for "non-fibrous membranes". Despite their wide-spread use for fibrous media, one is hard-pressed however to find a critical analysis in the scientific literature regarding their fundamental reliability.

Experimental results will be reported on commercial glass microfiber media, which were evaluated with 3 commercial porometers as well as a device designed in-house. Parameters such as the wetting liquid, the sample diameter, the scanning speed, and the sequence of operation were varied. The results will show under which conditions one can obtain reliable and meaningful results.